Elizabeth B. Keller

December 28, 1917 — December 20, 1997

Dr. Elizabeth B. Keller, a member of the Cornell University faculty for 23 years, died of leukemia on December 20, 1997 at the age of 79. She was a valued friend and colleague to many of us in the Section of Biochemistry, Molecular, and Cell Biology and to others on this campus. Like some other biochemists of her generation, she had an unending love of her discipline that led her to continue her research and teaching up until a week of her death.

Dr. Keller (born Elizabeth Waterbury Beach) was the youngest of three daughters of Frederick P. Beach and Ruth W. Beach, Congregational missionaries in China. Her childhood in Fujian Province, China, had a major impact upon her character and outlook on life. She attended Oberlin College for two years and received a B.A. degree from the University of Chicago in 1940. Her Ph.D. work, carried out under the direction of Dr. Vincent duVigneaud at the Cornell Medical College in New York City, was on the formation and transfer of methyl groups in metabolism and involved some of the early uses of radioisotopes to trace metabolic pathways. From 1949-60 at Harvard University and the Massachusetts Institute of Technology, she studied the process by which cells make proteins, a subject that was central to biochemistry and the newly emerging field of molecular biology at that time. Among her major accomplishments of that period were working out methods for concentrating all of the protein factors necessary for performing protein synthesis in a test tube, showing that GTP was required for protein synthesis in addition to ATP, and finding that large particles (now called ribosomes) are necessary for protein synthesis.

Recruited to Cornell by Dr. Robert Holley, Dr. Keller became a member of the faculty in 1965. She contributed to the work that culminated in the determination of the nucleotide sequence of a transfer RNA from yeast, work for which Holley received the Nobel Prize. Dr. Holley shared the prize money with his close colleagues, including Dr. Keller. A feature of transfer RNAs that is mentioned in every biochemistry textbook, its ability to fold into a cloverleaf structure, was the brainchild of Dr. Keller. The focus of some of her later work centered on signals required for initiation of transcription of genes in multicellular organisms, using as an example a muscle-specific gene from the fruit fly. In addition, she chose to study a family of genes and their protein gene products, the Ras family, that are known to be altered in a large percentage of some cancers. She worked on where these proteins are localized within cells, and investigated changes in the properties of cells caused by different members of the Ras family.

In reviewing Dr. Keller's scientific work, one can find a continuous thread that runs through it, all related to the expression of genes. She was a major participant in three landmark areas of biochemistry, starting with her work reporting the chemical synthesis of methionine labeled with carbon 14 that was the starting point for tracing the flow of methyl groups in metabolism. The Nobel prize awarded to Vincent duVigneaud was based in part upon this work. Having a labeled amino acid in hand, it was natural to extend her studies to how amino acids made their way into proteins, a problem that she tackled in collaboration with Dr. Paul C. Zamecnik at the Huntington Laboratories at Harvard and the Massachusetts General Hospital in Boston. Her papers during that period of the 1950s are classics, essentially laying out the major outlines of protein synthesis. The protein synthesis trail led inevitably to RNA, and her admiration for Robert Holley's work led her to Cornell in Ithaca and her important contribution to the structure of tRNA. The last-mentioned contribution stemmed in part from her love of and need to visualize molecules with models, usually simple models that she constructed from paper and paper clips, or pieces of wire. Some of her models were used by colleagues for decades in teaching undergraduate students.

Dr. Keller's work was funded continuously by the National Institutes of Health from the time of her appointment at Cornell University until her retirement. She trained nine Ph.D. students, two of whom work in industry and the others having faculty positions in various parts of the world. In addition, her laboratory provided training to nine postdoctoral students. Dr. Keller was a mentor to many undergraduate students. At the time of her death, four undergraduate students were working on independent research projects with her, and three of them continued their projects and wrote honors theses. Dr. Keller maintained an active correspondence with many of her students, including undergraduate students who worked with her.

Dr. Keller was instrumental in designing and teaching laboratory exercises that served well a generation of undergraduate and graduate students. She was not comfortable in front of large audiences, but overcame that shyness when asked to present lectures in cell biology, something she did for the last 10 years. Her lectures were characterized by meticulous preparation.

Dr. Keller's style was to work behind the scenes to insure an environment where all could work effectively. She was the person who made sure that common equipment worked, that the distilled water was of high purity, and that the library had the best collection of books. Inspection of the library in the Biotechnology Building, now the Elizabeth B. Keller Reading Room, offers a glimpse of her personality. The choice of books and journals reflects Dr. Keller's tendency to focus on the essentials, and the orderly atmosphere mirrors her uncluttered mind.

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